

FUJITSU LIMITED

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FUJITSU

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January 27, 1995

Mr. William F. Caton
Acting Secretary
Federal Communications Commission
1919 M Street, N.W.
Washington, D.C. 20554

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JAN 30 1995

Re:ET Docket No. 914-124

In the matter of
Amendment of Parts 2 and 15
of the Commission's Rules to Permit
Use of Radio Frequencies Above 40 GHz
for New Radio Applications

FCC MAIL ROOM

Dear Mr. Caton

Transmitted herewith by Fujitsu Limited are an original and nine copies of Comments in the above-referenced proceedings. Fujitsu requests that the Commission accept the attached comments.

Should there be any questions concerning this matter, please communicate with this office.

Sincerely yours,

Yoshikuni Toko
Yoshikuni Toko
General Manager
Radio and Satellite
Communications Division
FUJITSU LTD.

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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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JAN 30 1995

FCC MAIL ROOM

In the matter of

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Amendment of Parts 2 and 15

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of the Commission's Rules to Permit

) ET Docket No. 914-124

Use of Radio Frequencies Above 40 GHz

) RM-8308

for New Radio Applications

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TO: The Commission

COMMENTS ON NOTICE OF PROPOSED RULE MAKING

Fujitsu Limited, a major manufacturer of microwave communications equipment and microwave compound semiconductor device has the following comments on the Notice of Proposed Rule Making (FCC 94-273) issued by the Federal Communications Commission:

- For the 59 to 64 GHz band assigned to unlicensed devices, a 1-GHz band from about 60 to 61 GHz should be assigned to vehicular radar systems.
- To avoid harmful interferences between unlicensed devices and vehicular radar system, the above frequency band should be limited for vehicular radar systems only.

1. Background

In the late 1970s, Fujitsu Limited and Fujitsu Ten Corporation started development of a millimeter-wave collision avoidance radar for use in motor vehicles. In 1980, Fujitsu Ten developed a vehicular radar system with a frequency of 50 GHz, at first. Fujitsu Ten supplied the radar to Toyota for testing. After a 1000-km running test, Toyota announced the test results at several international conferences.

After a break of several years, Fujitsu and Fujitsu Ten began to develop a new vehicular radar system in 1988. The frequency was changed to 60 GHz ⁽¹⁾. In 1990, Fujitsu and Fujitsu Ten developed a high-sensitivity receive system ⁽²⁾. The EIRP of vehicular radar systems was gradually reduced from 20 to 10 dBw, and the sensing range improved from 60 to 100 m. This led to development of a vehicular radar transmitter based on HEMT devices instead of Gunn diodes ⁽³⁾. In 1991, Fujitsu developed a sensor for a vehicular radar system using both HEMT and MESFET. This sensor was supplied to Fujitsu Ten and is now undergoing field tests.

¹ The 60-GHZ band has the following well-known characteristics:

- The oxygen absorption band suppresses radio interference and allows many systems to coexist.
- The oxygen absorption range is 5 GHz wide; this allows high-speed data communications and broadcasting systems to be created easily.
- Absorption and attenuation by oxygen and water vapor do not have significant affect on short-distance radio systems (100 to 300 m).

By considering these characteristics, Fujitsu has been studying and developing not only vehicular radar systems but also wireless Ethernet and ATM LANs, wireless cables, and wireless links for video cameras in the 60 GHz band.

² U.S. Patent 5381153, Jan. 10, 1995

³ Fujitsu invented the High Electron Mobility Transistor (HEMT) in 1979. The HEMT has greatly contributed to the development of high-performance receivers for satellite broadcasting, satellite communications, and radio astronomy and small millimeter-wave equipment.

Fujitsu is also dedicated to the development of MMIC technology to produce millimeter-wave communications equipment at low prices. We have already created an experimental 60-GHz MMIC based on HEMT.

We are continuing our development efforts to improve vehicular radar systems to a production level and to satisfy the price requirements of automobile manufacturers.

Fujitsu has already developed a practical 60-GHz sensor for vehicular radar systems and is preparing the MMIC and other technology for production. We are ready to supply 60-GHz sensors early. We believe assigning a part of the 60-GHz band to vehicular radar systems will be highly beneficial for users in the United States.

2. Discussion

2.1 Dual use

The 60-GHz band is 5 GHz wide, and will be assigned to multi-cell high-speed wireless LANs, wireless cables, and radio links for video cameras which need a very wide band. Releasing the band of unlicensed devices to vehicular radar systems will greatly benefit both manufacturers planning to develop new radio systems and users who want to use them.

In the next decade, the highest demand is expected for vehicular radar systems among millimeter-wave equipment. MMICs, antennas, and other low-price millimeter-wave components developed for vehicular radar systems may be applicable to other radio systems as is or after slight changes. Components development for mass-market radio systems often lowers the prices of radio equipment for bands of similar frequency.

It is well known that the components produced for cellular phones can be applied to other radio equipment with only minor changes. This enables the equipment of other markets to be supplied at remarkably low prices. If there is a large market of system equipment using a

band close in frequency, components can be supplied for equipment of a limited market at acceptable prices.

2.2 Frequency and band width

In Japan, Research and Development Center for Radio Systems (RCR) discussed the frequencies and bandwidth for vehicular radar systems during 1992-1993.

Considering the bandwidth of spread spectrum, FM-CW, and pulse Doppler systems and the frequency stability of millimeter-wave oscillators, RCR concluded that vehicular radar systems would require a bandwidth of 1 GHz at 60-GHz band.

2.3 Interference

It is well known that there is an absorption band caused by absorption of oxygen molecules in the atmosphere in 60 GHz band. The absorption helps prevent interference between vehicular radar systems and general unlicensed device systems. However, we suggest that the vehicular radar systems band should be appropriate to minimize the likelihood of interference to such systems. The reasons of the suggestion is as follows:

-For general unlicensed device bands, install places couldn't control. This will cause the interference that have possibility of vehicular radar's system failure.

-The EIRP of the vehicular radar systems are about 15 dBw and the EIRP of the general unlicensed device systems are approximately -6 dBw. Because the vehicular radar systems have 20 dB higher EIRP than that of the general unlicensed device systems, the vehicular radar systems have a possibility of making a great interference to the general unlicensed device systems.

3. Conclusion

For the above reasons, Fujitsu hopes that the Commission will assign part of the 60-GHz band to vehicular radar systems.

Respectfully submitted

By: *Yoshikuni Toko*

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